

PATENT SPECIFICATION

612,962



Application Date: June 11, 1946. No. 17485/46.

Complete Specification Accepted: Nov. 19, 1948.

Index at acceptance:—Class 6(iii), C6(a: k).

COMPLETE SPECIFICATION

Improvements in or relating to Combine Harvesters

ERRATUM

SPECIFICATION No. 612,962.

Page 2, line 33, for " Fig. 4 " read
" Fig. 6 "

THE PATENT OFFICE,
14th May, 1949.

ing or conveying the cut grain from the harvester cutter bar and platform laterally and thence rearwardly onto the conveyor which elevates the crop into the threshing mechanism.

For many years it has been the practice in the industry to construct combines with a long cutter platform extending laterally from a conveyor housing into which the grain is fed by apron or auger conveyors that move the grain lengthwise of the pan. As the grain then enters the housing it is engaged by feeder-beaters that operate to kick the grain back onto an inclined endless conveyor which in turn elevates it into the thresher. In such cases the feeder-beaters are operated at relatively high speeds and therefore have a tendency to throw or fan some of the grain forwardly as well as rearwardly. For that reason it has been necessary to provide an enclosing hood or housing that extends forwardly from the feeder housing, and it is this housing into which the grain is fed laterally as above noted.

While such a construction has certain advantages it does have the disadvantage that the total width of the machine must

deflectors are employed. In others one or two platform augers are used and the sickle bar extends not only throughout the length of such auger or augers but also extends across the entire width of the thresher conveyor. It is this latter type of machine with which the present invention is concerned, and what appears to be a novel and ingenious device has been developed to cooperate with other and associated mechanism to not only cut grain over the greatest possible width of the machine but to direct it laterally from either or both sides and join it with grain cut in advance of the thresher conveyor, for straight through delivery to the thresher, and without the necessity of employing rapidly rotating beaters and protective housings therefor. Generally speaking this device includes a rotary feeder drum or cylinder which travels at approximately the same surface speed as the thresher conveyor, and has a plurality of longitudinally and circumferentially spaced fingers which are automatically extended and retracted over predetermined travel periods whereby they will operate to engage the rearwardly and

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612.962



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COMPLETE SPECIFICATION

Improvements in or relating to Combine Harvesters

I, STANLEY GUSTAV DEHN, M.A., of Kingsway House, 103, Kingsway, London, W.C.2, a British subject, Chartered Patent Agent, do hereby declare the nature of this invention (a communication to me from Minneapolis-Moline Power Implement Company, a corporation duly organized under the laws of the State of Delaware, United States of America, of 5 2854, Minnehaha Avenue, Minneapolis, State of Minnesota, United States of America), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to grain combines of the self-propelled harvester-thresher type, and the primary object is to provide an improved type of mechanism for feeding or conveying the cut grain from the harvester cutter bar and platform laterally and thence rearwardly onto the conveyor which elevates the crop into the threshing mechanism.

For many years it has been the practice in the industry to construct combines with a long cutter platform extending laterally from a conveyor housing into which the grain is fed by apron or auger conveyors that move the grain lengthwise of the pan. As the grain then enters the housing it is engaged by feeder-beaters that operate to kick the grain back onto an inclined endless conveyor which in turn elevates it into the thresher. In such cases the feeder-beaters are operated at relatively high speeds and therefore have a tendency to throw or fan some of the grain forwardly as well as rearwardly. For that reason it has been necessary to provide an enclosing hood or housing that extends forwardly from the feeder housing, and it is this housing into which the grain is fed laterally as above noted.

While such a construction has certain advantages it does have the disadvantage that the total width of the machine must

include the width of the conveyor and housing in addition to the length of the cutter bar, because the presence of the 50 housing prevents effective use of cutting mechanism directly in front of the thresher conveyor.

Various methods have been tried to overcome the aforementioned and other 55 disadvantages inherent in that type of combine, and this has developed, in recent years, in several designs of so-called "straight through" combines in which much of the grain is cut immediately in front of and across the entire width of the thresher conveyor as well as to one or both sides thereof. In some of these machines no lateral platform conveyors are employed with a result that cutting 65 widths are limited, even though angular deflectors are employed. In others one or two platform augers are used and the sickle bar extends not only throughout the length of such auger or 70 augers but also extends across the entire width of the thresher conveyor. It is this latter type of machine with which the present invention is concerned, and what appears to be a novel and ingenious device 75 has been developed to cooperate with other and associated mechanism to not only cut grain over the greatest possible width of the machine but to direct it laterally from either or both sides and 80 join it with grain cut in advance of the thresher conveyor, for straight through delivery to the thresher, and without the necessity of employing rapidly rotating beaters and protective housings therefor. 85 Generally speaking this device includes a rotary feeder drum or cylinder which travels at approximately the same surface speed as the thresher conveyor, and has a plurality of longitudinally and circumferentially spaced fingers which are automatically extended and retracted over pre-determined travel periods whereby they will operate to engage the rearwardly and 90

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laterally incoming grain, feed it under and rearward, and then discharge it for further travel to the thresher under the action of an endless conveyor.

- 5 According to the present invention there is provided a combine with a harvester part and a thresher part and a conveyor structure connecting the two parts to convey crop materials from the harvester part to the thresher part, including
10 a feeder assembly disposed above the conveyor and retractable crop engaging member forming part of the assembly to positively engage the crop material during
15 the downward and rearward rotation of a portion of the feeder assembly.

In the accompanying drawings, which illustrate a preferred embodiment of the invention,

- 20 Fig. 1 is a side elevation of a combine, as seen from the left.

Fig. 2 is a top or plan view of the machine shown in Fig. 1 with fractional parts broken away.

- 25 Fig. 3 is an enlarged detail elevation on line 3—3 in Fig. 2.

Fig. 4 is an enlarged detail elevation of a drive chain mechanism mounted on the right hand side of the feeder housing.

- 30 Fig. 5 is an enlarged sectional elevation as seen substantially on the irregular line 5—5 in Fig. 3.

- 35 Fig. 6 is a perspective detail view of a guide bar device used interiorly of the feeder drum.

Fig. 7 is a perspective detail of an angular guide element used at the tapered ends of the drum.

- 40 Referring to the drawings more particularly and by reference characters, 8 designates the main frame of the machine, the same being supported by widely spaced forward driving wheels 9 and by a rearwardly disposed steering truck 10.

- 45 An engine 11 provides power for propelling the wheels 9 as well as for operating the various cutting, feeding and threshing mechanisms, and this engine and the various mechanisms are adjusted from an operator's station 12. The
50 machine is also steered from the same station, the operator controlling the truck 10 through hand wheel 13 and connections 14.

- 55 The combine proper includes a harvester A, which cuts the grain as the machine progresses over the field, a thresher B, which separates the grain from the straw, and a feeder housing C, through which the cut grain is conveyed from the harvester to thresher. After
60 separation the straw and chaff are discharged rearwardly, as at 15, while the clean grain is elevated into a hopper 16 by elevator 17.

The harvester comprises the usual platform 18, which, in the present instance, extends laterally to both sides from the feeder housing, and has a cutter or sickle bar 19 which extends the entire width of the machine thus insuring a maximum width of cut. A conventional reel 20 moves the grain into proper cutting contact with the sickle, and as the grain is severed it falls back on the platform 18 where it is engaged by conveyors such as opposed augers 21 and by them conveyed inwardly or toward the center of the platform 18. These augers are supported only at their outer ends with a result that their inner ends are suspended or open and therefore readily discharge the grain at the inner or delivery ends.

A longitudinally extending endless conveyor 21^a or apron operates over a rearwardly inclined false bottom 22 of the housing C, to carry the grain up into the thresher, in well known manner, and this conveyor also extends with its lower end horizontally forwardly to a point immediately back of the cutter bar 19, as clearly shown in Figs. 2 and 3. The forward end of this conveyor passes around a roller 23, while the upper end passes over a similar but driven roller (not shown). The upper run of the apron 21^a is held down in proper grain receiving position by lateral guide strips 24 secured to the side walls 25 of housing C, and the lower run of the apron is similarly guided, at the turning angle, by strips or curved guide members 25^a, which are spaced between the false bottom 22 and the real bottom 26 of the housing. It will thus be seen that the conveyor apron 21^a will operate in the position shown in Fig. 3, and with the upper surface carrying the grain rearwardly and angularly upwardly to the separator, as indicated by the arrows.

110 Journalled for rotation in the forward part of the housing C, and spaced above the lower inclined portion of conveyor 21^a, is a drum shaped feeder device D. The drum-shaped feeder device D and the housing C constitute the feeder assembly. The crop engaging members are the arms 47. This device consists of a main cylindrical shell 27 terminating in tapered or trunco-conical end portions 28, and having end walls 29 from which extend trunnions 30 and 31 that rotate in bearings 32 of the side walls 25. The trunnion 31 is driven through a slip clutch 33 by a sprocket gear 34. This gear is driven through sprocket chain 35 from a pinion 36 on shaft 37, shaft 37 in turn having a gear 38 meshing with chain 39 conveying power from the engine. It may here be noted that shaft 37 extends

through to the opposite side of the housing (see Fig. 1) where it operates through suitable transmission to drive the reel 20 and cutter bar 19.

Returning now to the detailed construction and operation of the feeder D it will be noted that the trunnions 30 and 31 are tubular and serve as bearings for stub shafts 40 and 41 of crank arms 42. The arms 42 support aligned studs 43 which are inserted in and carry a tubular shaft or pipe 44. The shafts 40 and 41 extend outwardly beyond the trunnions 30 and 31 sufficiently to engage bracket arm 45, and which have for their function to hold the cranks 42 against rotation when the drum 27 is being driven.

The pipe 44 is provided with a longitudinally spaced series of collars 46 to each pair of which is secured a circumferentially spaced series of crop engaging members or arms 47. All of the arms of each series, except one, are pivoted to the collars so as to give them freedom for limited swinging movements. The exception in each series is an arm 47^a (Fig. 3), attached rigidly to the collar, and has for its purpose to insure rotation of the pipe 44 on the studs 43 in synchronism with the drum. The arms, it will be noted, all project through slots 48 in the drum, and since the axis of pipe 44 remains fixed in an offset or eccentric position with respect to the axis of the drum the effect of the arrangement will be to project the arms 47 beyond the drum periphery, to form grain engaging fingers, during the downward and rearward movement of the drum rotation. Thus, the cut grain accumulating at the central portion of the harvester will be positively engaged by the fingers and be fed downwardly and rearwardly into delivery contact with the conveyor apron 21^a. The arms then retract as they start moving upwardly thus preventing any of the grain from continuing the rotation and returning to the forward side.

As it is desirable to completely retract the fingers within the drum, as indicated at the upper right in Fig. 3, we provide arm guides well within the drum periphery. These are in the form of channel members 49 which are riveted or welded to the drum interior and have slots 50 which register with the slots 48. Additionally, the members 49 are provided with bearing pins or abutments 51 which are secured at the ends of the slots 50 in a position to directly engage the edges of arms 47. These wear pins are of rounded and hardened material and have for their purpose to prevent wearing contact between the bars 47 and the

edges of the slots 48 and 50.

In Fig. 7 is illustrated an angularly designed form of bracket 52 which is so shaped as to accommodate itself to the conical ends 28 of the drum while guiding 70 the end series of arms 47.

The operation of the device while possibly obvious from the foregoing may be briefly restated as follows:

As the machine progresses over the grain field the sickle 19 severs a wide swath, and the reel 20 brushes the cut grain back upon and into contact with the auger conveyors 21 and the central conveyor 21^a. The grain falling on apron 21^a is immediately and continuously supplemented by the grain which is fed inwardly from both sides by the augers 21, and as the total volume of cut grain accumulates in this central zone in front of the drum D the fingers formed by the projected arms 47 reach forward to engage the grain and then by continuous rotation cause a constant and uniform feed of the grain to pass under the feeder drum and be deposited upon the apron 21^a. With particular reference to Figs. 2 and 5 it may be explained that the tapered ends 28 of the drum are so disposed with respect to the discharge ends of the augers 21 as to combine with apron 21^a in producing tapered or narrowing throat to better accommodate the laterally received grain, and then feed it rearwardly.

With this arrangement and construction the feeder D can be rotated by a comparatively slow speed. In fact a surface speed equalling that of the apron 21^a is quite sufficient.

The feeder assembly comprising the drum D and the conveyor 24 is, therefore, operated at substantially the same surface speed, and hence, the upper and lower layers of crop material passing between the conveyor and the drum, will be moved towards the thresher part at the same rate of speed.

It is to be understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A combine with a harvester part and a thresher part, and a conveyor structure connecting the two parts to convey crop materials from the harvester part to the thresher part, including a feeder assembly disposed above the conveyor and retractable crop engaging member form-

ing part of the assembly to positively engage the crop material during the downward and rearward rotation of a portion of the feeder assembly.

2. A combine, as set forth in Claim 1, including means for extending the crop material engaging members as they rotate downwardly and thence rearwardly while they are adjacent to and in conjunction with the rearwardly moving part of the conveyor.

3. A combine, as set forth in Claim 1, including means for retracting the crop material engaging members during the upward movement of the rotation of the feeder assembly, whereby the crop material will be disengaged for deposit on the conveyor.

4. A combine, as set forth in Claim 1, with a transversely extending platform, the conveyor being endless and having an upper run for conveying cut crop material rearwardly but extending to a point adjacent the forward edge of the platform to directly receive the crop material as it is cut while the feeder assembly is rotatably arranged over the upper run of the endless conveyor.

5. A combine, as set forth in Claims 1 and 4, with a transversely extending crop receiving platform and means above the lateral extensions of the platform for conveying material cut by the harvester laterally of the conveyor in direction towards the conveyor and feeder assembly.

6. A combine, as set forth in Claim 1, including means for operating the feeder assembly and the conveyor at substantially the same surface speeds, whereby upper and lower layers of the crop material passing between the same will be moved in direction towards the thresher part at the same rate of speed.

7. A combine, as set forth in Claims 1 to 3, wherein the crop material engaging members are automatically rotatable with the drum forming a part of the feeder assembly, as said drum rotates to effectively engage and urge the crop material into contact with the conveyor and then disengage the crop material.

8. A combine, as set forth in Claims 1 to 3, including means for slidably guid-

ing the crop material engaging members 55 on the rotary drum of the feeding assembly during the movement of said members relatively of the drum.

9. A combine, as set forth in Claims 1 and 5, including in the feeder assembly 60 a generally cylindrical drum having tapered extensions at both ends towards which the grain is fed by the conveyors operative relatively to the lateral extensions of the platform.

10. A combine, as set forth in Claims 1, 5 and 9, in which the conveyors co-operating with the lateral extensions of the harvester are constructed in the form of aligned grain augers which feed the 70 crop material in direction towards the tapered extensions of the cylindrical member of the feed assembly.

11. A combine, as set forth in Claims 1 and 7, including in the interior of the 75 drum forming part of the feeder assembly a member rotatable relatively with the drum and eccentrically supported with respect thereto, the crop material engaging members being attached at their 80 inner ends to said relatively rotatable member in the interior of the drum, whereby they will be projected and retracted when the drum and the member are rotated about their respective axes. 85

12. A combine, as set forth in Claims 1 and 5, in which the endless conveyor in the form of an endless belt extends from a point adjacent the forward edge of the platform of the harvester horizontally, 90 rearwardly and then upwardly and rearwardly towards the thresher part, including guides for holding the upper and lower runs of the conveyor down where it is deflected from horizontal to inclined 95 operating positions, the rotary feeder assembly being in cooperation with the upper run of the conveyor near the lower end of the inclined portion thereof.

13. A combine, substantially as 100 described and shown, and for the purpose set forth.

Dated this 11th day of June, 1946.

For the Applicant,

FRANK B. DEHN & CO.,

Chartered Patent Agents,

Kingsway House,

103, Kingsway London, W.C.2.

[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1.

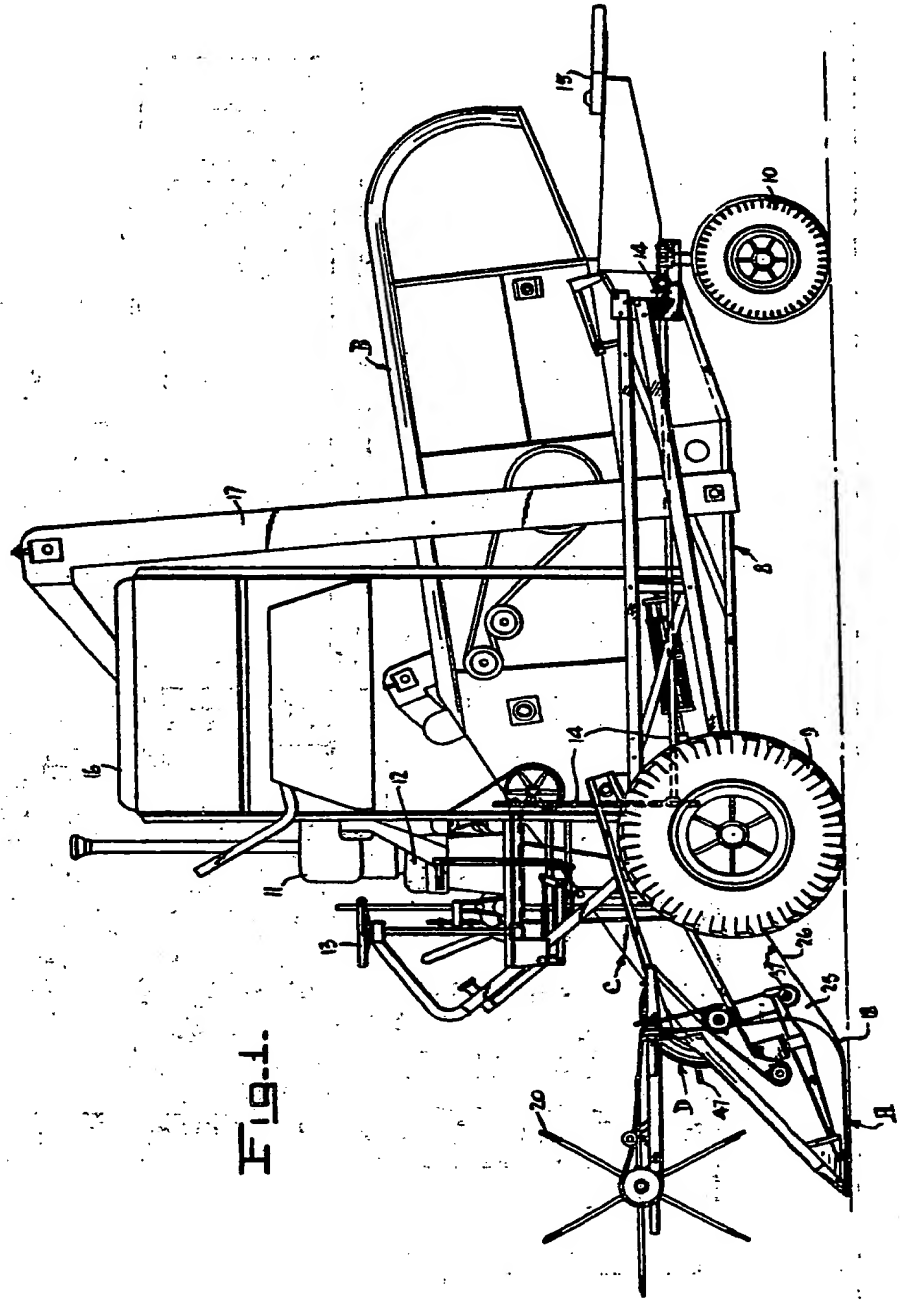
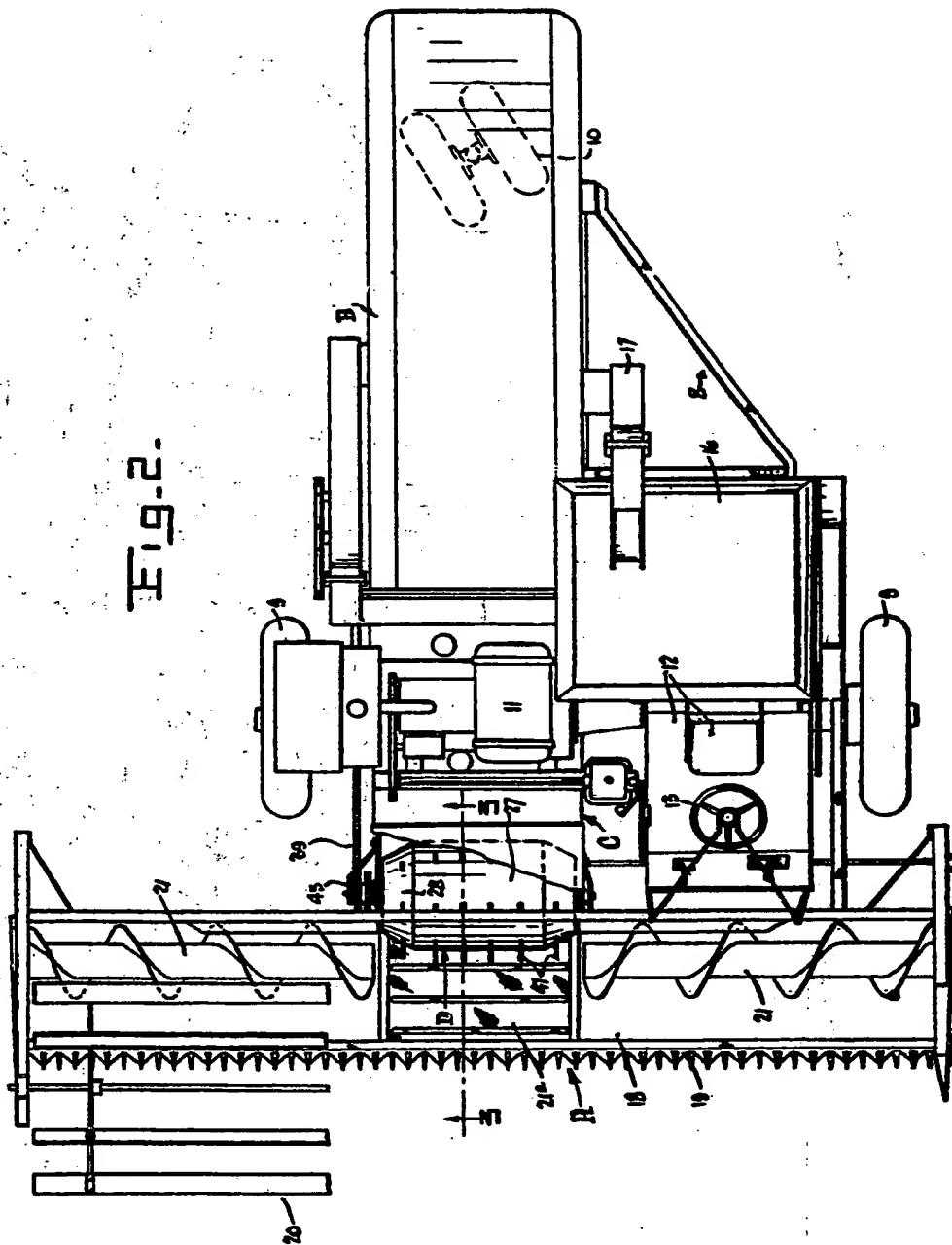


Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale]

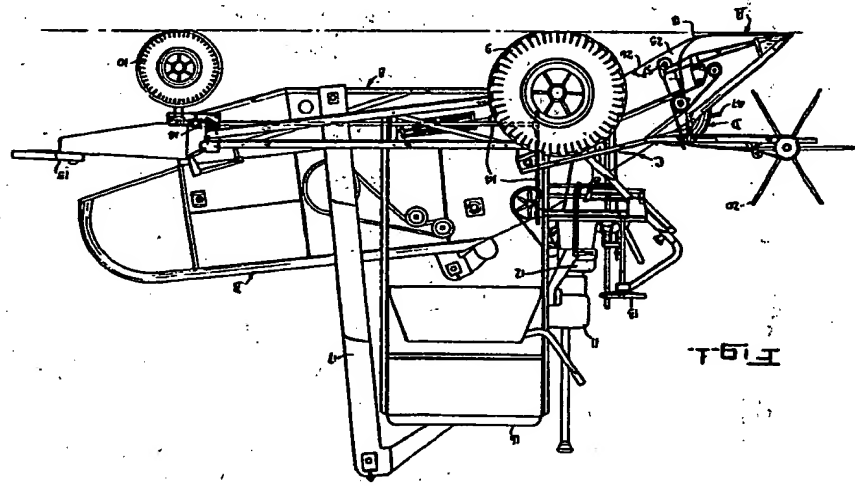


Fig. 1.

SHEET 1

612,962 COMPLETE SPECIFICATION

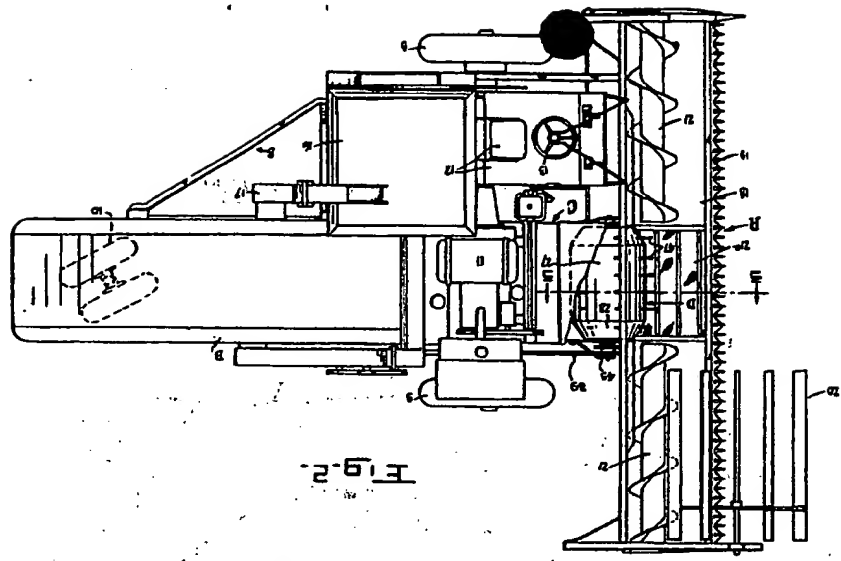
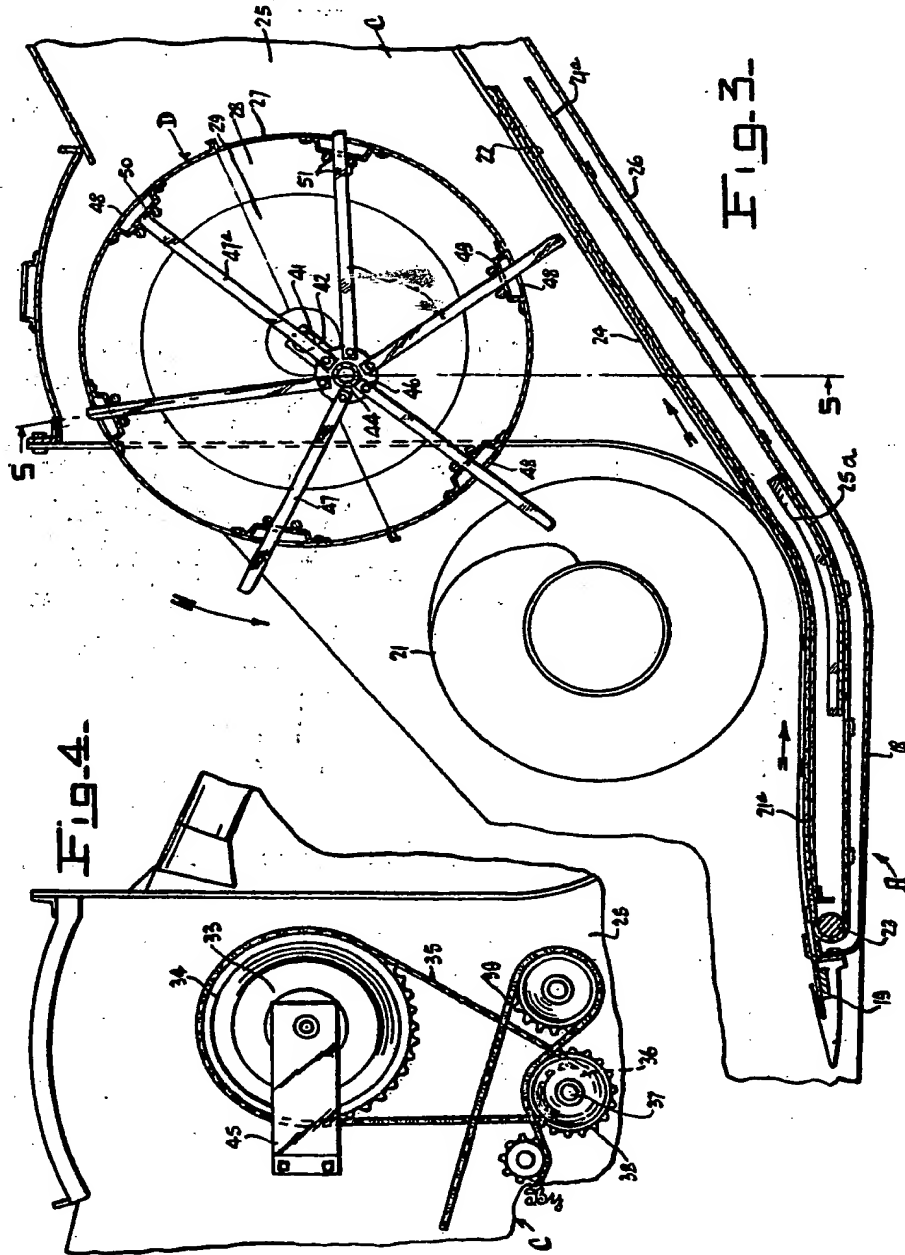


Fig. 2.

4 SHEETS
SHEET 2

H.M.S.O. 21, 21

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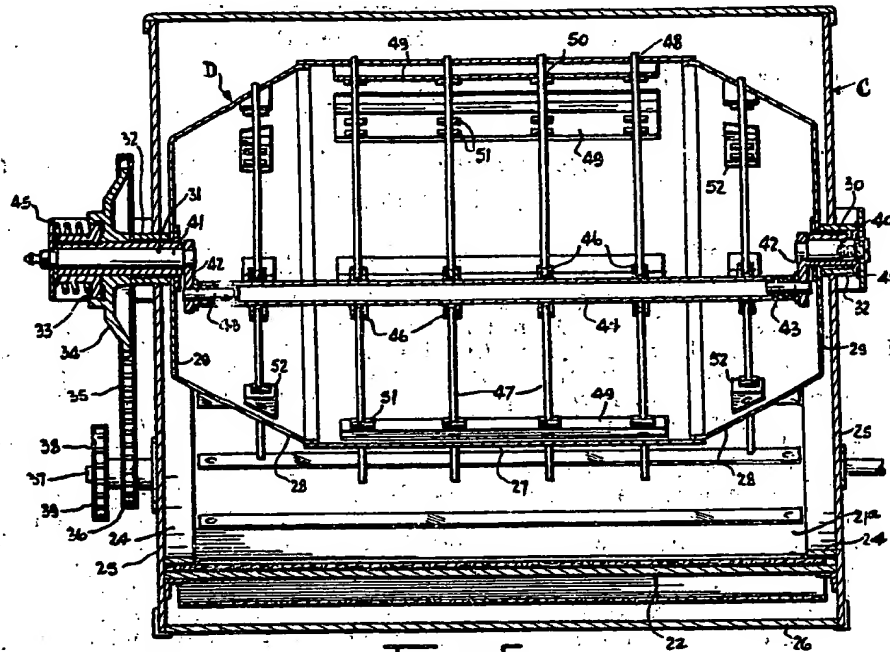


Fig. 5.

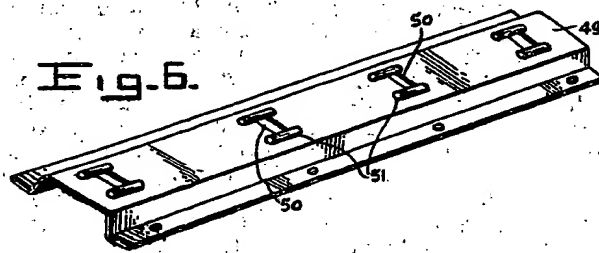


Fig. 6.

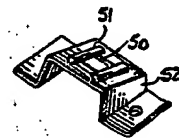


Fig. 7.